

DRAGONFLIES (ODONATA) OF DINGHU SHAN BIOSPHERE RESERVE, GUANGDONG PROVINCE, CHINA

Keith Duncan Peter Wilson

Senior Fisheries Officer

Agriculture and Fisheries Department, Hong Kong Government, 6F, 25 Borrett Road,
Mid-Levels, Hong Kong Email: wislonhk@hk.super.net

This paper is dedicated to Philip S. Corbet on the occasion of his 70th birthday.

Received 10 July 1998; revised 12 October 1998; accepted 12 November 1999

Key words: Odonata, Dinghu Shan reserve, China, taxonomy, geographic distribution.

Abstract

Seventy-six species of Odonata are recorded from Dinghu Shan Biosphere Reserve, Guangdong Province, China, following surveys completed during 1992-1998. A new species of *Cephalaeschna* (Aeshnidae) and a new species of *Philosina* (Megapodagrionidae) are described and illustrated. The previously unknown female of *Stylurus nanningensis* Liu (Gomphidae) is also described. *Asiagomphus septimus* (not of Needham) from Hong Kong is synonymised with *Asiagomphus hainanensis* Chao. *Aciagrion tillyardi* Laidlaw (Coenagrionidae) is recorded from Chinese Territory for the first time. *Zygonyx takasago* Asahina (Libellulidae) previously considered a Taiwanese endemic, is recorded from continental China. A key is provided to separate the three Chinese species of *Zygonyx*. A total of twenty-eight taxa are recorded from Guangdong Province for the first time. The odonate fauna of Dinghu Shan is compared with neighbouring Hong Kong and Taiwan.

Introduction

Dinghu Shan Biosphere Reserve is located near Zhaoqing, approximately 86 km west of Guangzhou and some 170 km north-west of Hong Kong on the Tropic of Cancer (23°09'21"-21°11'30"N and 112°30'39"-112°33'42"E). A high proportion of the 1,155 ha reserve (79%) is covered by subtropical forest which includes areas of primary forest, which are at least 400 years old (Kong, 1993). The reserve was among the first of a series of Chinese National Nature Reserves established by the First Conference of the National People's Delegation in 1956. In 1979 it was recognised by UNESCO as a Man and Biosphere Reserve. The area has been occupied for many years by Buddhists who established temples in the area. The Buddhist monk Zhi Chang established the first temple there, the Baiyun Temple, in 678 AD during the Tang Dynasty. In the Song Dynasty (960-1279) the Yuelong Buddhist nunnery was founded. A third Buddhist temple was constructed in 1633 known as the Qingyun Temple. The Buddhists have undoubtedly been responsible for the protection of the forests in the area for many centuries. Although small the reserve is an important remnant of primary monsoon rainforest in central Guangdong. A diagram of

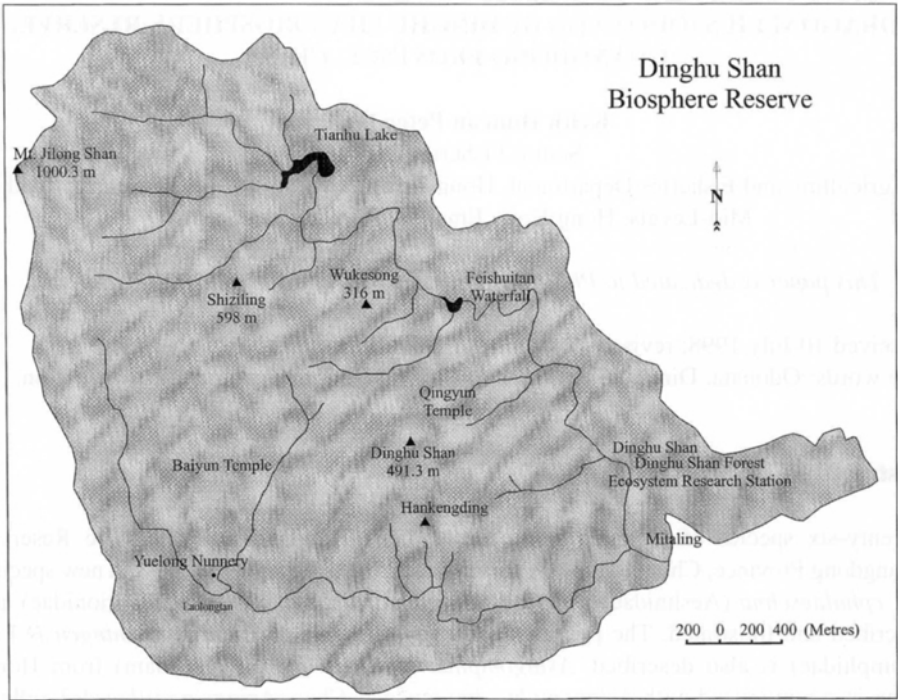


Figure 1. Map of Dinghu Shan Biosphere Reserve.

the reserve is provided in Fig. 1.

The mean annual temperature is 20.9 °C with a mean maximum of 28.1 °C in July and a mean minimum of 12 °C in January. Rainfall is high with a mean of 1,956 mm but there is a distinct seasonal pattern, with most rainfall falling in the April to September period. During the June 1994 survey it rained torrentially for prolonged periods every day with widespread flooding and landslips throughout the region. The highest altitude in the reserve occurs at Jilong mountain peak at 1000.3 metres.

Dinghu Shan is the type locality for *Leptogomphus perforatus* Ris, which hitherto has not been found outside Guangdong. One further species found at Dinghu Shan, *Drepanosticta brownelli* Tinkham is also endemic to Guangdong (Wilson, 1997a). *Philosina alba* sp. n. and *Cephalaeschna dinghuensis* sp. n., discovered during the recent surveys, must also be considered as Guangdong endemics.

Surveys

Odonate Surveys were conducted at Dinghu Shan during the following periods: 15-20 April 1992 (D.C. Cook and K.D.P. Wilson), 5-8 June 1992 (D.C. Cook), 12-16 June 1993 (K.D.P. Wilson), 10-16 June 1994 (K.D.P. Wilson), 1-4 June 1995 (K.D.P. Wilson) and

6 May 1998 (G. Reels). Gomphids were observed emerging in April 1992 but very few odonates were encountered on the wing and no material was collected.

List of species recorded

The taxonomic order follows Bridges (1994). Synonymic notes and details of material are provided for selected taxa and species not previously recorded from Guangdong. Common species collected during the surveys, which have been previously recorded from Guangdong, are listed in Table VI.

FAMILY: Calopterygidae

Matrona basilaris basilaris Selys, 1853

Matrona basilaris: Needham, 1930: 199-201, "China and Formosa".

Material: 1 male, 1 female, Dinghu Shan, 14.VI.1993; 1 male, do., 10.VI.1994; 1 male, do., 14.VI.1994; 3 male, do., 15.VI.1994; 1 male, do., 3.VI.1995.

Calopteryx melli Ris, 1912

Calopteryx melli: Ris, 1912: 55-56, pl. 3, Fig. 3, "Tsaiyiusan, Guangdong"; Needham, 1930: 195-196, "Tsaiyiusan, Guangdong"

Material: 1 male, Dinghu Shan, 16.VI.1994.

Distribution: China (Guangdong).

FAMILY: Synlestidae

Sinolestes edita Needham, 1930

Sinolestes edita: Needham, 1930: 242-243, pl. 16, Fig. 20, "holotype female, Zhejiang"; Chao, 1947: 21, "Fujian"; Asahina, 1956, 214-218, Figs 16-19, "Zhejiang".

Sinolestes ornata: Needham, 1930: 242-245, pl. 16, Fig. 19, "holotype male, Zhejiang"; May, 1933: 259, "Guangzhou, Guangdong".

Material: 1 male, Dinghu Shan, 6.V.1998, leg. G. Reels

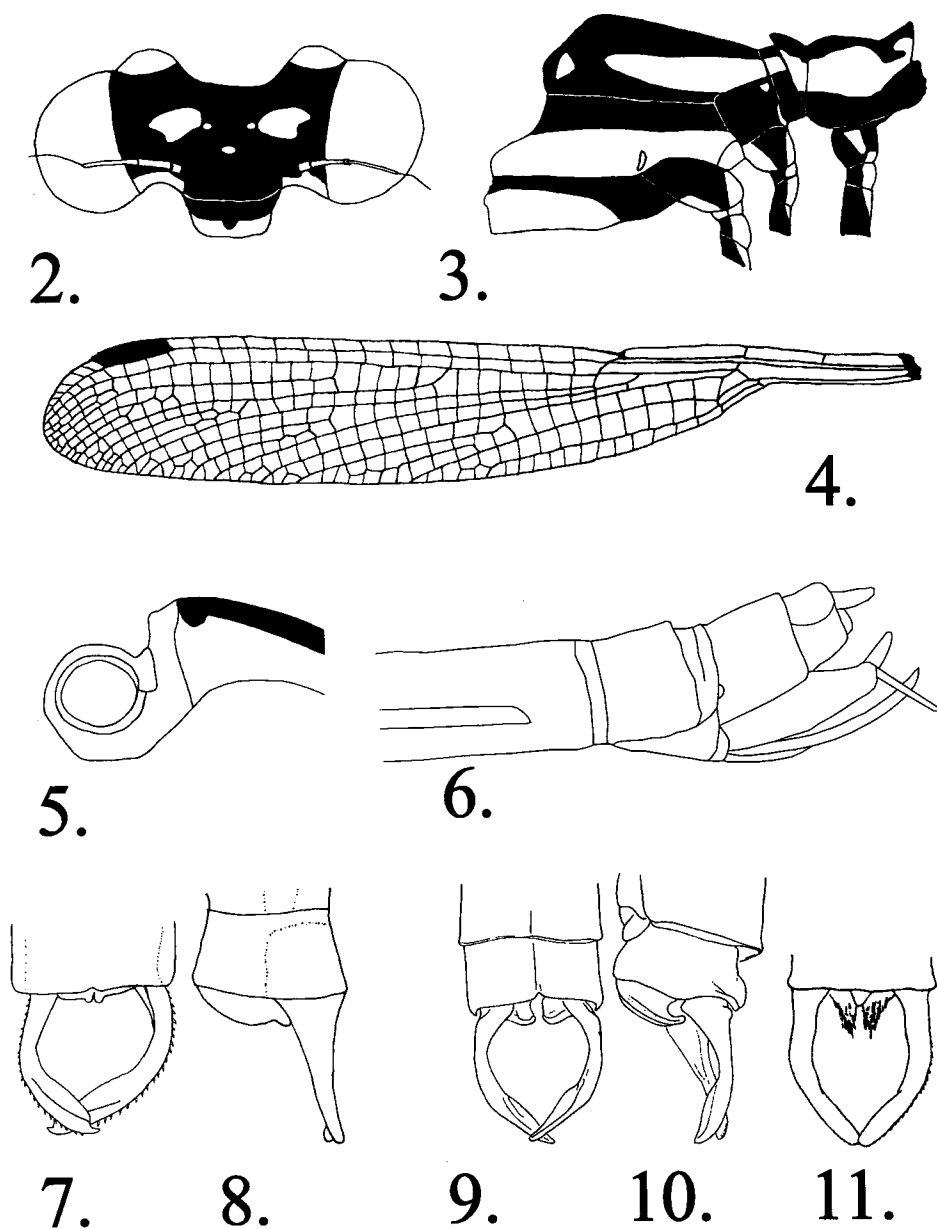
Distribution: China (Fujian, Guangdong, Guangxi and Zhejiang).

FAMILY: Megapodagrionidae

Agriomorpha fusca May, 1933

Agriomorpha fusca: May, 1933: 342, "3 male, 1 female, type-loc. Fan-Chi-Schan, Guangdong, 18.VII., leg. Mell"; Asahina, 1965: 497, Figs 14-15, "Hong Kong"; Asahina, 1987: 17-18, 22, Figs 48-55, 72-73, "Hong Kong"; Matsuki et al, 1990: 13, Fig. 7, "Hong Kong"; Wilson, 1995b: 44, 51, "photo, male, female, Hong Kong"; Saito & Ogata, 1995: 29, Figs 22-23, "Hong Kong".

Material: 1 male, Dinghu Shan, 6.V.1998, leg. G. Reels



Figures 2-11. [2-8] *Philosina alba* sp. n., Dinghu Shan, Guangdong: (2) male head, dorsal view; (3) male thorax, lateral view; (4) male wing; (5) male penile organ, lateral view; (6) female caudal appendages, lateral view; (7) male caudal appendages, dorsal view (8) male caudal appendages, lateral view; [9-10] *Philosina buchi*, from Asahina, 1979: (9) male caudal appendages, dorsal view; (10) male caudal appendages, lateral view; [11] *Philosina buchi*, from Needham, 1930: male caudal appendages, dorsal view.

***Philosina alba* sp. nov.** (Figs 2-8, 26A, C)
(Table I)

Material: Holotype: 1 male, Dinghu Shan, 13.VI.1994, coll. K.D.P. Wilson. Paratypes: allotype female, do., 14.VI.1994, coll. K.D.P. Wilson; 2 male, do., 14.VI.1994; 3 male, do., 3.VI.1995. Holotype and allotype deposited at the British Museum Natural History.

Description: Stout, medium-sized damselfly which, when mature, becomes heavily pruinose white over the entire abdomen. It strongly resembles *Philoganga*, a member of the Amphipterygidae.

Male - Head (Fig. 2, 26 A, B). Labrum pale yellow. Labium pale green or greenish yellow with central round black spot linked to fine black basal border. Postclypeus black. Genae glossy, greenish yellow. Base of mandibles yellow. Frons and top of head matt black. Large quadrangular yellow spot adjacent to lateral ocelli. Large yellow postocular spots. Prothorax (Fig. 3) matt black with broad, yellow, lateral stripes. Thorax (Fig. 3) black with broad, yellow, humeral stripes, which do not extend to wing border. Small isolated yellow spot at wing border. Metepisternum with broad yellow stripe covering the spiracle. Lower metepimeron with broad yellow stripe not extending to anterior border. Coxae black with outer margins yellow. Trochanters black with outer face yellow. Whitish pruinoscence on head and thorax but pattern remains discernible. Legs dark blackish brown with inner margin of femora yellow at base. Wings uniformly hyaline with black venation. Pterostigma reddish brown. The fore-wing is illustrated in Fig. 4. Abdomen black with broad yellow stripe, lateral stripes. Segments 3-7 with triangular-shaped yellow, lateral stripes broadest at base and not extending to distal border. Segments 8-9 with narrow lateral, yellow stripes. Dorsum of segment 10 yellow finely bordered black at base. The dorsum and sides of the abdomen of mature males is uniformly pruinose white. The yellow pattern on the sides is just discernible but the black dorsum is white. Superior appendages (Figs 7-8) black, forceps-shaped, and slightly broadened before tip, which is sharply pointed. Numerous short, stout spines on outer margin of superior appendages. Penile organ (Fig. 5) simple with tip forming a circle.

Female (Fig. 26C) - A stout damselfly with a strong resemblance to the female of *Philoganga*. Markings of head, prothorax and thorax very similar to male but lacking pruinoscence on thorax and abdomen. Pruinoscence is present on coxae and sides of prothorax. Antehumeral stripe is yellow at base but distal 4/5's and isolated humeral spot are greenish yellow. Abdomen black with sides of segment 1 pale greenish yellow. Segment 2-7 with broad lateral stripe slightly expanded at base on segments 3-6. Segments 8-9 black. Dorsum of segment 10 white. The ovipositor, which is illustrated in Fig. 6, is robust and extends beyond tip of abdomen.

Measurements (mm): Male abd. + app. 36.0-39.5, hw. 28.0-31.5; female abd. + app. 33.0, hw. 29.5.

Remarks: Ris created the genus *Philosina* in 1917 to receive the species *Philosina buchi* from Fujian. Needham (1930: 240-241, pl. 16, Fig. 17) described and recorded *buchi* from Fujian and Guangxi. Needham's drawing of the caudal appendages is reproduced here in Fig. 11. Asahina (1979: 330-332, Figs 1-5) also figured the caudal appendages of *Philosina*

buchi from material taken from Shaowu, Fujian and Canton, Guangdong. These drawings are reproduced here in Figs 9-10. The *buchi* appendages are simple and very similar to *alba* but lack the sharply pointed, notched tip. The name *Philosina* was chosen due to the superficial structural resemblance to *Philoganga* (a large calopterygid), also from southern China. *Philosina alba* is about 25% smaller in length than *buchi*. It has a different head pattern and abdominal pattern. I have examined several male specimens of *Philosina buchi* from Guangxi Province during 1997. These specimens are much larger than *alba* and all possess bright brick red colouration on the dorsum of abdominal segments 7-9. The main differences between these two species are summarised below in Table I.

FAMILY: Coenagrionidae

Table I. Principal differences between *Philosina buchi* and *Philosina alba* sp. n.

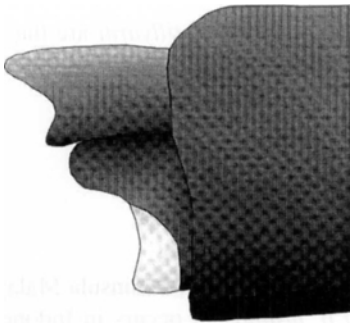
Character	<i>Philosina buchi</i> Ris, 1917	<i>Philosina alba</i> sp. n.
Size	Male abd. + app. 44.0-48.0, hw. 39.0-41.0; female abd. + app. 41.0, hw. 38.5.	Male abd. + app. 36.0-39.5, hw. 28.0-31.5; female abd. + app. 33.0, hw 29.5.
Labium	Male: Black with olive green marks at lateral third of anterior half	Male: Labium pale green or greenish yellow with central round black spot linked to fine black basal border
Vertex	Black	Black with yellow quadrate spots adjacent to lateral ocelli
Wings	Tipped brown. Post nodal veins in fore wing circa 21	Uniformly clear. Post-nodal veins in fore wing circa 14 (see Fig. 4).
Abdomen	Male: Segments 7-9 dorsally bright red, segment 10 wholly black. With age dorsum of abdomen 1-6 becomes pruinosed white.	Male: Segments 7-9 black with yellow lateral stripe and dorsum of segment 10 yellow finely bordered black. With age entire dorsum of abdomen is white.
Superior appendages	Tip without notch and not sharply pointed (see Figs 9-11).	Tip notched with sharply pointed tip (see Figs 7-8).

Aciagrion tillyardi (Laidlaw, 1919) (Figs 12-13, 26(F))

Aciagrion tillyardi: Laidlaw, 1924: 66: 3-5 (key), 6, pl. 1 (Fig. 15), “Singapore, Malaysia”; Lieftinck, 1935: 92/93: 12, “Sumatra”.

Material: 1 male, Dinghu Shan, 12.VI.1993, 1 male, do., 16.VI.1993; 2 male, 2 female, do., 16.VI.1993; 5 males, 2 females, do., 10.VI.1994; 1 male, do., 3.VI.1995.

Description: A medium-sized *Aciagrion* species; male with violaceous markings on head and thorax and violaceous blue tip on segments 8-9 of the abdomen.



12.



13.

Figures 12-13. *Aciagrion tillyardi* Dinghu Shan, Guangdong: (12) male caudal appendages, lateral view; (13) male secondary genitalia, lateral view.

Male - Labium pale yellow. Labrum, anteclypeus and frons violaceous. Small dark spot discernible at base of anteclypeus. Postclypeus black. Top of head black with small violaceous postocular spots linked by a narrow, violaceous, transverse stripe across the occiput. Prothorax with anterior lobe pale and sides bluish violet otherwise black. Thorax black dorsally which extends beyond the humeral suture into the metepisternum. Narrow violaceous antehumeral stripe. The remaining three-quarter of the metepisternum is bluish violet fading to a pale bluish green on the metepimeron. Legs white with femora broadly striped black on the outer surface. Wings hyaline with greyish pterostigma, which is much larger in fore wing than hind wing. Dorsum of abdominal segments 1-7 and 10 black with sides of segments 1-2 and lateral base of 3 pale blue. Segments 8-9 wholly violaceous blue. Dorsal base of segments 3-7 narrowly ringed with pale whitish yellow and black areas are narrowly expanded laterally at apical border. Distal third of segment 7 and segments 8-10 markedly dilated. Length of superior caudal appendages (Fig. 12) half their width, when viewed laterally, and slightly longer than the inferior appendages; coloured black. Distal, ventral mark on inferior appendage pale which is otherwise black. The penile organ is illustrated in Fig. 13.

Female - Similar head and thoracic pattern to male but predominant colour is yellow. Abdomen black with tenth abdomen segment blue. Segment 9 with large blue spots laterally at distal margins. Intersegmental membrane between segments 7-8 and 8-9 blue.

Measurements (mm): Male. Abd. + app. 22.0-25.0, hw. 13.5-15.0; female abd. + app. 22.0, hw. 14.5.

Remarks: There has been some confusion over records of *Aciagrion* from China. Needham (1930) provides records and a description of *Aciagrion hisopa* Selys from Sichuan, Taiwan and Fujian. Lieftinck et al (1984) assigned Needham's Chinese *hisopa* records to *Aciagrion migratum* (Selys, 1891). *Aciagrion migratum* is the only *Aciagrion* hitherto recognised from China. Nine species of *Aciagrion* are known from Indo-China and 13 species in total

are known from the oriental region. These Dinghu Shan records of *tillyardi* are the first records for Chinese territory. I have also collected identical *tillyardi* material from Da Ming Shan, Guangxi.

Distribution: China (Guangdong and Guangxi), Indonesia (Sumatra) and India.

***Pseudagrion pruinosa fraseri* Schmidt, 1934**

Pseudagrion elongatum: Needham, 1930: 261-262, "Guangxi".

Material: 1 male, Dinghu Shan, 12.VI.1993; 1 female, do., 12.VI.1994.

Distribution: China (including Guangdong and Guangxi), Indonesia, Peninsula Malaysia and Thailand. The nominate subspecies *Pseudagrion p. pruinosa* occurs in Indonesia. *Pseudagrion p. ranauense* is known from Indonesia, Peninsula Malaysia, Vietnam and Thailand.

FAMILY: Platystictidae

***Drepanosticta brownelli* Tinkham, 1938 (Fig. 26D)**

Drepanosticta brownelli: Tinkham, 1938: 17-19, Figs 1-2, "type loc.: Tai-wa-tsz (Monastery), 5 miles NW of Ts'ing-Yuen city (Qingcheng, Guangdong), 28-29.VII.1935, leg. Chauncey W. Brownelli; Loh Fau Shan, Guangzhou, Guangdong, 24.VII.1935"; Wilson, 1997a: 59-61, Figs 26-27, 30-31, "female, Dinghu Shan, Guangdong, China, 3.VI.1995; 1 male, do., 11.VI.1994; 2 male, do., 16.VI.1994; 7 male, do., 2.VI.1995; 8 male, do., 3.VI.1995."

Material: No additional material.

Remarks: Wilson (1995b) examined *Drepanosticta brownelli* material from Dinghu Shan and remarked that Hong Kong material, treated by Asahina (1987: 15, Figs 39-47) as *Drepanosticta brownelli*, belonged to a separate taxon, which was subsequently described as *Drepanosticta hongkongensis* Wilson (1997a).

Distribution: China (Guangdong).

***Protosticta beaumonti* Wilson, 1997**

Protosticta sp.: Wilson, 1995b: 78-79, 83, 85, "photo male, female, Hong Kong".

Protosticta beaumonti: Wilson, 1997a: 57-59, Figs 11-16, 4 male, Dinghu Shan, 13.VI.1994; 2 male, Dinghu Shan, 3.VI.1995".

Material: No additional material.

Distribution: China (Guangdong and Hong Kong).

FAMILY: Protoneuridae

***Prodasineura croconota* (Ris, 1916)**

Disparoneura croconota: Ris, 1916: 18, "Type-loc. Taiwan"; Needham, 1930: 283, 285, "Taiwan".

Prodasineura croconota: Matsuki, 1991: 27-28, Figs 1-4 (larva), "larva desc; Taiwan"; Wilson, 1995b: 84-87, 89, "photo male, female, Hong Kong"; Wilson, 1997b: 25, "Hong Kong; 2 male, 1 female, Dinghu Shan, Guangdong, 14.VI.1994".

Material: No additional material.

Remarks: Wilson (1997b) highlighted the minor colour differences between Taiwanese

croconota and Hong Kong *croconota*. The Dinghu Shan *croconota* are identical to Hong Kong forms.

Distribution: China (Guangdong, Hong Kong and Taiwan).

SUBORDER: ANISOPTERA

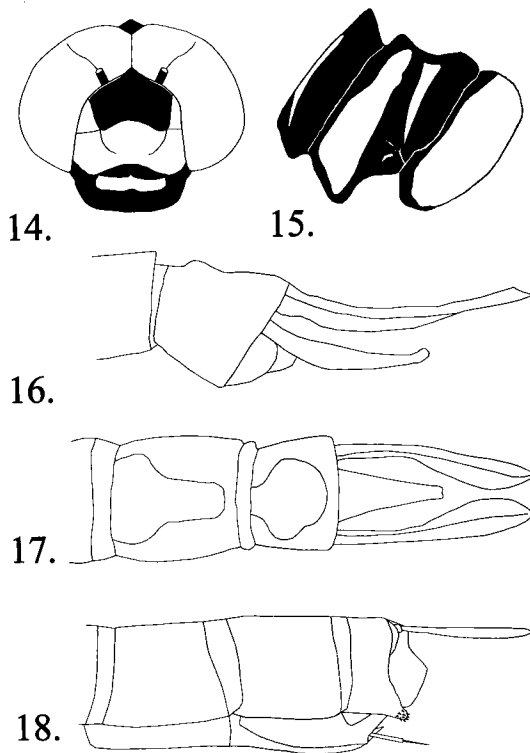
FAMILY: Aeshnidae

Anax immaculifrons Rambur, 1842

Anax immaculifrons: Martin, 1908: 18-19, Fig. 12, "India, Hong Kong"; Ris, 1916: 63, "Hong Kong"; Needham, 1930: 73, "Hong Kong"; Asahina, 1965: 500, "Hong Kong"; Matsuki et al, 1990: 16, "Hong Kong"; Asahina, 1986: 101-104, Figs 101-107, "Thailand & Hong Kong"; Wilson, 1995b: 92-93, 97, 99, "photo male, female, Hong Kong".

Material: 1 male (observed), Dinghu Shan, 12.VI.1993; 1 male (observed), do., 16.VI.1994.

Remarks: The male Hong Kong form has a ferruginous orange abdomen with no blue at the side of the basal segments. The male Indian forms are coloured blue at the side of the basal abdominal segments and the general colour form is much darker.



Figures 14-18. *Cephalaeschna dinghuensis* sp. n., Dinghu Shan, Guangdong: (14) male head, frontal view; (15) male thorax, lateral view; (16) male caudal appendages, lateral view; (17) male caudal appendages, dorsal view; (18) female caudal appendages, lateral view.

***Cephalaeschna dinghuensis* sp. nov.** (Figs 14-18)

Material: Holotype: female, Dinghu Shan, 4.VI.1995. Paratypes: 1 male (poor condition), Dinghu Shan, 14.VI.1993; 1 female (poor condition, teneral, with distal abdomen missing), do., 16.VI.1993; Holotype to be deposited at Tai Lung Experimental Station, Agriculture and Fisheries Department, Lin Tong Mei, Sheung Shui, Hong Kong Government SAR, China.

Description

Female - When viewed frontally, face approximately half the width of the head. Labium pale ferruginous brown. Basal half of labrum, creamy yellow with lateral margins and distal border mid brown. Anteclypeus brown. Postclypeus and sides of frons pale yellow. Top of frons tumid and pointed with dorsal surface mid brown, bordered yellow. The front of the frons is also mid brown, bordered pale yellow. The front of the head is illustrated in Fig. 14. Vertex black, raised. Occiput mid brown, raised. Thorax matt black with fine yellow antehumeral stripes which are angled towards each other. Dorsal carina of thorax raised with a distinct peak. The antehumeral stripes are closest to each other towards the wings and fall well short of the mesepisternum. The side of the thorax is dark matt brown with two broad yellow stripes on the mesepimeron and the metepimeron. A third smaller triangular-shaped yellow stripe is located on the metepisternum. The lateral pattern of the thorax is illustrated in Fig. 15. Legs distinctly bicoloured. Trochanters and basal two-thirds of femora very pale brown, almost white and distal one-third of femora, tibia and tarsi dark brown. Wings hyaline. Medial space with 3-5 cross-veins. No extensions of subcostal vein beyond the nodus in holotype but all wings of second female with extensions into first cell. Pterostigma dark brown, braced, covering 5-6 cells. Dorsal surface of abdomen blackish brown with only segments 2 and 3 with dorsal markings. These consist of pairs of yellow triangular spots posterior and parallel to the transverse carina. Entire ventrum of segments 1-2 yellow. Ventrum of segments 3-8 black with basal yellow spots. Caudal tip of abdomen is illustrated in Fig. 18. Segments 9-10 entirely blackish brown. Segment 10 with dentigerous plate, not elongated into two long spines, but slightly elongated with ventral tip possessing numerous small, stout spines. Cerci, the longest in the genus (4.5 mm) and more than twice the length of segment 10 (2.0 mm). Ovipositor does not extend beyond the tip of segment 10.

Male - (poor condition teneral). Similar to female. Face approximately half the width of the head coloured as female. Trochanters and basal three-quarters of femora very pale brown, almost white and distal one-quarter of femora, tibia and tarsi dark brown. Wings hyaline. Pterostigma braced, pale brown. Subcostal vein extended into first post-nodal cell on all wings which is a feature seen in some wings of *Cephalaeschna acutifrons* (cf. Asahina, 1983: 55, Fig. 12). Dorsum of abdomen mid-brown and dorsum of segment 1 unmarked. Ventral half of abdominal segments 1-2 yellow. Dorsum of segment 2 with five triangular yellow spots; one at the base, two posterior to the transverse carina and two at the posterior border. Basal half of segment 2 narrows, when viewed from the dorsum, to less than half its maximum width with one small, central pale yellow spot and two lateral pale yellow spots at the base. Segment 2-8 with two small triangular yellow spots posterior to and parallel to the transverse carina. Segment 9 and 10 black, each with a large, basal yellow spot occupying most of the dorsal surface. Caudal appendages

are illustrated in Figs 16-17. Superior caudal appendages, when viewed dorsally, have flattened rounded blades with sharply pointed tips to apices. When viewed laterally the apices of the superior appendages are flat, without dorsal or ventral bulges. The inferior appendage is long more than half the length of the superior appendages.

Measurements (mm): Male abd. + app. 47.0, hw. 43.5; female abd. 48.0, abd. + app. 52 (app = 4.5), hw. 48-48.5.

Remarks: Currently, there are four closely related genera of Oriental Brachytroninae: Brachytronini, which possess cross-veins in the medial space. These include *Cephalaeschna*, *Gynacanthaeschna*, *Periaeschna* and *Petaliaeschna*. Fraser (1936), in his key to the Indian genera of Aeshnidae, isolated *Petaliaeschna* from these genera, inter alia, by the lack of a braced pterostigma. He used the lack of a dentigerous plate in *Cephalaeschna* to separate it from *Petaliaeschna* and *Gynacanthaeschna*. Fraser differentiated *Gynacanthaeschna* from *Petaliaeschna* by the nature of the elongate spines on the female dentigerous plate i.e. *Gynacanthaeschna* with 2 robust opposed spines and *Petaliaeschna* with 2 long divaricate spines.

Asahina (1981a) produced a revised key to *Cephalaeschna* and its allies. He used the same principle feature as Fraser to separate *Petaliaeschna* but dropped the dentigerous plate character as a means of enumerating the remaining three genera. He chose, instead, to separate *Periaeschna* due to the presence of a narrow frons, the width being smaller than the head width. Asahina then differentiated *Cephalaeschna* from *Gynacanthaeschna* by, inter alia, the juxtaposition of the pterostigmal brace with the pterostigma (it is located on the inner border of the pterostigma in *Cephalaeschna* and slightly **external to the inner border** in *Gynacanthaeschna*) and the lack of any projections from the female ventral abdominal segment 10 in *Cephalaeschna*.

Cephalaeschna obversa is an example of a *Cephalaeschna* possessing a reduced dentigerous plate, which lacks elongate spines (cf. Asahina, 1981b: 3, Fig. 5). *Cephalaeschna dinghuensis* also possesses a reduced dentigerous plate without elongate spines.

There are twelve species of *Cephalaeschna* recorded from Burma, Butan, China, India and Nepal and six of these are known from China. These are listed in Table II. The closest congeners to *dinghuensis* are *risi* Asahina (1981b), *needhami* Asahina (1982) and *chaoui* Asahina (1982) from southern China. These species also have a relatively narrow frons for the genus and the males have pointed superior appendages. *Cephalaeschna dinghuensis* is easily separated from these taxa by the bicolour nature of the leg colouration, the presence of a reduced female dentigerous plate possessing numerous small spines, and elongate female cerci which are more than two times the length of segment 10.

Table II. Species of *Cephalaeschna*

Species	Author	Distribution
<i>C. acutifrons</i>	(Martin, 1909)	Burma, India, Nepal
<i>C. chaoi</i>	Asahina, 1982	China (Fujian)
<i>C. klapperichi</i>	Schmidt, 1961	Afghanistan, India, Nepal
<i>C. klotsi</i>	Asahina, 1982	China (Fujian)
<i>C. masoni</i>	(Martin, 1909)	India, Nepal
<i>C. needhami</i>	Asahina, 1981	China (Jiangxi)
<i>C. obversa</i>	Needhami, 1930	China (Sichuan)
<i>C. orbifrons</i>	Selys, 1883	India, Nepal
<i>C. patrorum</i>	Needham, 1930	China (Shaanxi, Sichuan, N. China)
<i>C. risi</i>	Asahina, 1981	China (Fujian, Guangdong: Tsa Yu San), Taiwan
<i>C. triadica</i>	Lieftinck, 1977	Butan
<i>C. viridifrons</i>	(Fraser, 1922)	Burma, India, Nepal

***Polycanthagyna erythromelas* (McLachlan, 1896)**

Polycanthagyna erythromelas: Wilson, 1995b: 102, 105, 107, "photo male, female, Hong Kong"; Saito & Ogata, 1995: 37, Figs 68-70, "Hong Kong".

Polycanthagyna erythromelas paiwan: Matsuki & Lien, 1985: "larva desc; Taiwan"

Material: 1 male, Dinghu Shan, Guangdong, 3.VI.1995.

Remarks: The adult colour pattern of the female and the immature male resembles male *Anax immaculifrons* but with hyaline wings. The larvae are found in isolated rocky pools, adjacent to fast flowing forested streams.

***Tetracanthagyna waterhousei* McLachlan, 1898**

Tetracanthagyna waterhousei: Asahina, 1988a: 695, "Hong Kong"; Matsuki, 1988: 37-40, Figs 1-12, "larva desc; Hong Kong and Thailand"; Wilson, 1995b: 3, 100-101, 105, pl. 1-5, "photo male, female, Hong Kong"; Saito & Ogata, 1995: 37, Figs 71-72, "Hong Kong".

Material: 1 female, Dinghu Shan, Guangdong, 13.VI.1994; 1 female, do., 14.VI.1994.

FAMILY: Gomphidae

***Anisogomphini* sp.**

Material: 1 teneral female, Dinghu Shan, 3.VI.1995.

Remarks: This species is likely to belong to *Merogomphus* or *Anisogomphus*. It does not belong to any of the known Chinese members of these genera. Since the specimen is female and teneral there is little point in naming it as a new species.

Description

Female - Labium black, labium black with pair of small yellow spots. Anteclypeus black with milky colouration. Postclypeus black. Frons with broad transverse yellow stripe. No horns on the vertex. Occipital ridge uniform with no significant features. Thorax black with yellow collar stripe and a pair of narrow dorsal stripes. No antehumeral stripes. Sides of thorax difficult to discern due to teneral nature of the specimen. Mesepimeron

with isolated yellow spot towards base of wings. Metepisternum with vague yellow stripe. Metepisternum yellow with lower anterior border black. Wings with anal loop wanting. A2 of hind wing adjoins triangle. Hind leg femora are long extending to mid point of abdominal segment 2. Hind leg femora possess two rows of long, numerous well-spaced spines. Abdomen dark brown marked with yellow pattern. Ventral half of segment 1 yellow. Segment 2 with mid dorsal spot, basal yellow band and ventral, basal three quarters yellow. Segment 3 with basal third of dorsum yellow and basal ventral half yellow. Basal one quarter of segments 4-7 yellow. Segments 8-10 dark brown/black. Subgenital plate deeply divided into two outwardly curved, bluntly pointed horn-like processes.

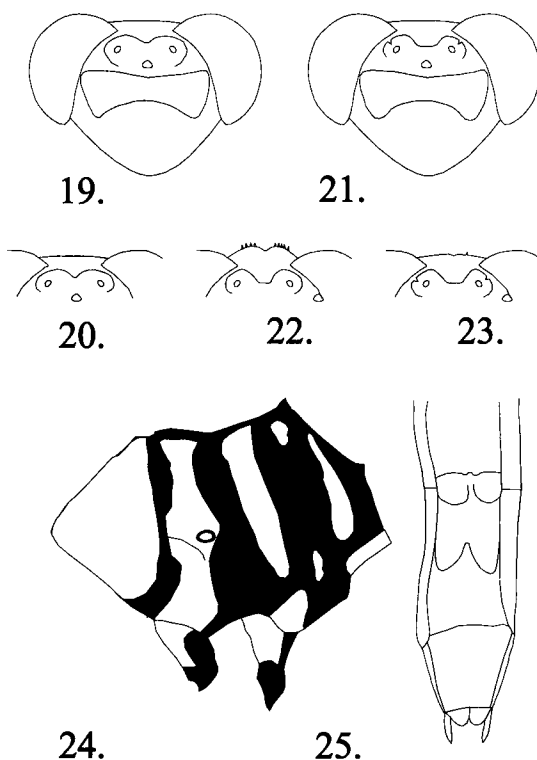
Anisogomphus anderi Lieftinck, 1948

Anisogomphus anderi: Zhao, 1990: 186-188, pl. 5-9.1 (Figs 1-6), "Fujian, Hunan, Yunnan".

Material: 1 male, Dinghu Shan, 14.VI.1993.

Distribution: China (Fujian, Guangdong, Hunan and Yunnan).

Asiagomphus sp. (Figs 19-25).



Figures 19-25. [19-20] *Asiagomphus* sp., Dinghu Shan, Guangdong: (19) male head, frontal view; (20) female occipital margin, frontal view; [21-22] *Asiagomphus hainanensis*, Hong Kong: (21) male head, frontal view; (22) female occipital margin, frontal view; [23] *Asiagomphus hainanensis*, Hong Kong: female occipital margin, 'masculine form', frontal view; [24-25] *Stylurus nanningensis*, Dinghu Shan, Guangdong: (24) female thorax, lateral view; (25) female caudal tip of abdomen, ventral view.

Material: 1 female, Dinghu Shan, 14.VI.1993; 1 male, do., 12.VI.1994.

The pair of *Asiagomphus* specimens collected from Dinghu Shan are problematical. The male strongly resembles *Asiagomphus hainanensis* (Chao, 1953) but the female has distinct characteristics indicating that the pair may represent a separate taxon.

Description: **Male** - Top of head has a narrowly divided frontal ridge and there are no small spines outside the lateral ocelli. The 1st and 2nd yellow lateral thoracic stripes are well separated. The posterior hamulus and penile organ are very similar to *hainanensis* (cf. Chao, 1953: 406, Figs 23 & 25). **Female** - Top of head, as male, with a narrowly divided post frontal ridge lacking any small spines outside the lateral ocelli. Occipital margin, illustrated in Fig. 20, is uniformly straight.

Remarks

There is some considerable confusion concerning *Asiagomphus septimus* (Needham, 1930) and *Asiagomphus hainanensis* (Chao, 1953). In order to assess the status of the Dinghu *Asiagomphus* some misconceptions regarding *Asiagomphus septimus* and *Asiagomphus hainanensis* require clarification.

Asiagomphus septimus Needham was described from continental male material from Fujian. *Asiagomphus hainanensis* Chao was also described, solely from male material, from Hainan. The male *septimus* was comprehensively illustrated by Chao (1953: 404, Figs 12-19) and similarly *hainanensis* by Chao (1953: 406, Figs 20-25). Chao (1953) did not describe or figure any female material of either species. The males of these two species are separated by the nature of the posterior hamulus. The tip of the male outer hamulus of *septimus* (Chao, 1953: 404, Fig. 14; Asahina, 1966: 109, Fig. 4) is much smaller when viewed in profile than that of *hainanensis* (cf. Chao, 1953: 406, Fig. 22; Asahina, 1966: 110-111, Figs 11 & 14). In addition the shaft of the posterior hamulus of *septimus* is much straighter than the stouter, humped posterior hamulus of *hainanensis*.

Females of *hainanensis* and *septimus* must be separated with considerable caution. Asahina (1978a: 3, 5-6, Figs 3-9) illustrated male and female *septimus* material from Fujian including the female occipital margin. The occipital crest in female continental *septimus* is strongly arched with a large U-shaped or semi-circular notch at the centre. Both the male and female continental *septimus* possess 1st and 2nd yellow lateral stripes which are joined at their middle section.

Asahina (1966: 111, Figs 15-16) described female *hainanensis* for the first time, from Hong Kong material. However, in Asahina (1988a: 689-690) he reidentified this material as *septimus*. These females have strongly arched occipital crest with a V-shaped notch bordered by several short, stout spines. I have taken many female specimens in Hong Kong with these characteristics. Having now studied considerable Hong Kong *Asiagomphus* material, both male and female, I am now convinced that Asahina had originally identified the Hong Kong female *hainanensis* correctly in his 1966 paper. Asahina (1988a: 690-691, Fig. 1) also described female *hainanensis* with an uniformly straight occipital margin with a very small v-shaped notch at the centre. I have obtained just one specimen of this form of *Asiagomphus hainanensis* female in Hong Kong which appears to be similar, if not identical, to Asahina's (1988a) *hainanensis* female from Taiwan. This Hong Kong

female was attributed to *hainanensis* in Wilson (1995a: 320-321, “1 female, She Shan, Lam Tsuen Valley, coll. as larva 11.VII.1993, emerged 30.VII.1993”). The occipital margin of this aberrant or ‘masculine’ *hainanensis* female form is illustrated in Fig. 23.

Asahina (1966: 109-110, 114, Figs 4-8, 24) has described *septimus* from Taiwan with well separated 1st and 2nd thoracic yellow stripes. In Hong Kong *septimus* males and females should both conform to the continental form with 1st and 2nd thoracic yellow stripes joined at the middle. All *Asiagomphus* in Hong Kong have well separated 1st and 2nd thoracic yellow stripes characteristic of *hainanensis*. I have also checked a large number of final instar *Asiagomphus* larvae in Hong Kong. The female larvae are all of the *hainanensis* type i.e. with very small valvula vulvae protruding from the ventral base of the 9th abdominal segment (cf. Matsuki, 1978; Zhao, 1990: 92, Fig. 25).

The typical form of the female continental *hainanensis* occipital margin is illustrated in Fig. 22 and in Asahina (1966: 111, Fig. 15). The female occipital margin illustrated in Fig. 23, and in Taiwanese female illustrated in Asahina (1988a: 690-691, Fig. 1), is the less common ‘masculine’ form of *hainanensis* (i.e. less common continental form). Apart from the nature of the occipital margin and the presence of small spines outside of the lateral ocelli this form of the *hainanensis* female is identical to the common Hong Kong *hainanensis* form. All Hong Kong records of *septimus* should be reidentified as *hainanensis*. The Hong Kong records for *septimus* are thus synonymised with *hainanensis* and amended as follows:

Asiagomphus hainanensis (Chao, 1953)

Gomphus sp.: Asahina, 1965: 499, “1 male, Tai Po Kau, Hong Kong, 21.IV.1965, leg. Hirashima; 1 male, Lam Tsuen Valley, Hong Kong, 30.V.1965”; Asahina, 1965: 499, “1 female, Tai Mo Shan, Hong Kong, 21.V.1965”;

Gomphus hainanensis: Chao, 1953: 398, 404-407, Figs 20-24, “Type-loc. Hainan”; Asahina, 1966: 111-112, Figs 9-16, 25-26, “Hong Kong material”; Asahina, 1966: 111-112, Figs 15-16, “1 female, Tai Mo Shan, Hong Kong, 21.IV.1965”.

Asiagomphus septimus (nec Needham): Asahina, 1988a: 690, “1 female, Tai Mo Shan, Hong Kong, 21.IV.1965, described as *hainanensis* in Asahina (1966) is reidentified as *septimus*”; Matsuki et al, 1990: 15, Fig. 13, “1 female, Tai Po Kau, Hong Kong, 6.V.1989”; Wilson, 1995a: 320-321, “1 female, Sha Lo Tung, Hong Kong, coll. as larvae 25.IV.1993, emerged 27.V.1993; 1 female, Sha Lo Tung, Hong Kong, 29.V.1993; 1 female, Wu Kau Tang, Hong Kong, 30.V.1993; 1 female, Sha Lo Tung, Hong Kong, 6.VI.1993”; Wilson, 1995b: 111, 113, “Hong Kong”; Saito & Ogata, 1995: 31, Fig. 30, 1 female, Tai Po Kau, Hong Kong, 3.VI.1994; 5 male, 1 female, Sha Lo Tung, Hong Kong, 4.VI.1994; 1 female, do., 13.V.1995; 3 male, 3 female, do., 2.VI.1996; 2 male, do., 4.VI.1995”; Muraki et al., 1996: 4, “1 female, Sha Lo Tung, Hong Kong, 7.VII.1995”; Wilson, 1996b: 20, “Hong Kong”.

Asiagomphus hainanensis: Asahina, 1988a: 689-691, Fig. 1, “1 male, Tai Po Kau, Hong Kong, 21.IV.1965; 1 male, Lam Tsuen Valley, Hong Kong, 30.V.1965; 1 female, Taiwanese material”; Matsuki et al, 1990: 15, Fig. 12, “1 male, Tai Po Kau, Hong Kong, 6.V.1989”; Zhao, 1990: 85, 87-92, 25 Figs (male, female, larva); Wilson, 1995a: 320, “1 male, Hoi Ha, Hong Kong, 3.V.1992; do. 1 male, 3.V.1992, leg. D. Cook; 1 male, Sha Lo Tung, Hong Kong, 16.V.1992, leg. J. Cook; 1 male, do., 18.VI.1992; 1 female, She Shan, Lam Tsuen Valley, Hong Kong, coll. as larva 11.VII.1993, emerged 30.VII.1993”; Wilson, 1995b:

102-103, 109, 111, “photo male, larva, Hong Kong”; Muraki et al, 1996: 3-4, “1 male, Tai Po Kau, Hong Kong, 8.VII.1995”; Wilson, 1997b: 29, “1 female, Lam Tsuen Valley, Hong Kong, coll. as larva I.1994 emer. III.1994; 1 male, Tai Tong, Hong Kong, 13.V.1995; 1 female, Tai Tong, Hong Kong, 28.V.1995; 4 male, Sha Lo Tung, Hong Kong, 25.VI.1995; 1 male, do., 27.VI.1995; 1 female, Sha Lo Tung, Hong Kong, 2.VII.1995”; Wilson, 1996b: 20, “Hong Kong”.

Hong Kong male *hainanensis* possesses a widely divided ridge and small lateral spines (see Fig. 21). This latter feature is also seen in some Hong Kong *hainanensis* females common form and in the less common form. *Asiagomphus hainanensis* from Hong Kong has a postclypeus with narrower lateral prominences than the Dinghu Shan species. In addition the post frontal tubercles of *hainanensis* are separated by a widely divided ridge whereas the Dinghu species is separated by a narrowly divided ridge (see Figs 19 and 20).

The Dinghu posterior hamulus of this taxon is very similar to Hong Kong *hainanensis*. The female is also very close to *hainanensis* but with a difference in the form of the occipital margin (see Fig. 20) which is uniformly straight and lacks any notch. It also lacks the small spines on the top of the head just outside of the lateral ocelli. Asahina (1988a) remarked that *hainanensis* female from Taiwan has a prominent post frontal tubercle forming a widely divided ridge directed backwards with small sharply pointed spines on the side of the lateral ocelli. The Dinghu Shan *Asiagomphus* possesses a narrowly divided post frontal ridge without spines outside the lateral ocelli.

It is likely that the Dinghu Shan *Asiagomphus* material represents a new taxon of *Asiagomphus*. However, the confusion over southern Chinese *hainanensis* underlines the need for a good series of specimens in this difficult group. Until further material is available I prefer to leave the identity of this taxon unresolved.

Remarks: *Asiagomphus hainanensis* is known from China (Fujian, Guangdong, Hainan, Hong Kong and Taiwan). *Asiagomphus septimus* is known from China (Fujian, Guangdong, Jiangxi and Taiwan).

Burmagomphus vermicularis (Martin, 1904)

Burmagomphus vermicularis: Chao, 1954: 69, 77-79, Figs 272-277, “Fujian”; Matsuki, 1978: 139 (larva key), 142, Fig. 8, “larva, Taiwan”; Zhao, 1990: 161, 173-176, pl. 5-7.8 (Figs 1-9, male, larva), “Fujian, Taiwan”; Wilson, 1995a: 322-323, “Hong Kong”; Wilson, 1995b: 104-105, 113, 115, “photo male, female, larva, Hong Kong”.

Material: 1 male, Dinghu Shan, 12.VI.1994.

Labrogomphus torvus Needham, 1931

Labrogomphus torvus: Needham, 1931: 224-227, Figs 1-4, “gen. nov. female, type-loc. Hainan”; Chao, 1954: 237-240, Figs 352-362 (male, female and larva), “Fujian”; Zhao, 1990: 151-155, pl. 5-5.1 (Figs 1-18, male, female, larva), “Hainan & Fujian”; Wilson, 1995a: 321-322, Fig. 1, “Hong Kong”; Wilson, 1995b: 104-105, 113, “larva, photo male, Dinghu Shan and Hong Kong”; Wilson, 1997b: 30, “Hong Kong”.

Material: 1 male, Dinghu Shan, 7.VI.1992 leg D. Cook; 1 male, 1 female, do., 13.VI.1994; 1 male, 14.VI.1994.

***Merogomphus paviei* Martin, 1904**

Merogomphus paviei: Martin, 1904: 214, "Tonkin"; Lieftinck *et al.*, 1984: 31-32, "Taiwan, syn. nov."; Zhao, 1990: 202-207, pl.5-10.2 (Figs 1-19), "Taiwan, Zhejiang"

Merogomphus chui: Asahina, 1968: 90-92, Figs 4-8, "Taiwan".

Material: 1 male, Dinghu Shan, 14.VI.1993; 1 male, do., 15.VI.1993; 1 male, do., 13.VI.1994; 1 male, do., 15.VI.1994.

Distribution: China (Guangdong, Taiwan and Zhejiang), Thailand and Vietnam.

***Stylurus clathratus* (Needham, 1930)**

Stylurus clathratus: Needham, 1930: 64, pl. 6 (Fig. 4), "Fujian"; Zhao, 1990: 116-119, pl. 5-2.2 (Figs 1-14), "Fujian, Taiwan, Sichuan".

Material: 1 female, Dinghu Shan, 13.VI.1994; 2 male, 1 female do., 15.VI.1994.

Distribution: China (Fujian, Guangdong, Sichuan and Taiwan).

***Stylurus nanningensis* Liu, 1985 (Figs 24-25)**

Stylurus nanningensis: Zhao, 1990: 133-136, pl.5-2.10 (Figs 1-9), "Guangxi".

A single second female specimen of *Stylurus* was obtained at Dinghu Shan. By a process of elimination (see remarks below) this taxon could not belong to any other Chinese taxon. Its thoracic pattern is identical to the male *nanningensis*. It is described here as the first female of *nanningensis*.

Material: First female (slightly teneral), Dinghu Shan, 10.VI.1994, coll. K.D.P. Wilson.

Description

Female - It is significantly smaller than *clathratus*. Central lobe of labium black with its base and lateral lobes yellow. Labrum glossy black with a pair of minute basal yellow spots. Mandible yellow, finely bordered black. Anteclypeus, postclypeus and front of frons black. Top of frons with broad, transverse yellow stripe. Top of head black with small tubercle above lateral ocelli but no hint of horns. Occipital ridge uniform with no distinctive features. Prothorax dark brown/black with large lateral yellow spots. Side of thorax illustrated in Fig. 24. Dorsum of thorax with frontal transverse stripe not linked to a pair of dorsal stripes. Antehumeral stripes reduced to a yellow spot at each end; the anterior spot confluent with katepisternum. Coxae dark brown/black with outer, posterior faces yellow. Mesepimeron and metepisternum with isolated broad yellow stripes. Metepimeron yellow bordered black at anterior margin. Abdomen black with conspicuous yellow markings. Dorsum of segment 1 and 2 with central yellow stripe and lateral ventral halves yellow. Dorsal base of segments 3-7 with small yellow spots. Base of segment 8 yellow bordered dark brown/black laterally. Segments 9-10 dark brown. Sub-genital plate of female illustrated in Fig. 25.

Measurements (mm): Female abd. + app. 45.0, hw. 35.0.

Remarks: The female *nanningensis* is remarkably similar to the female of *clathratus* (Needham) and differs only in two major respects. These differences include the absence of horns on the vertex and the lack of an antehumeral stripe. According to Zhao (1990) there are fourteen species of *Stylurus* described from China which is over half the total number of species assigned to this genus; the rest are mostly known from North America. Of these fourteen species, the females of *clathratus* (Needham), *erectocornis* Liu & Chao, *nobilis* Liu & Chao, *flavicornis* (Needham), *placidus* Liu & Chao, *takashii* (Asahina) pos-

sess small horns on the vertex above the lateral ocelli. Of the remaining taxa, *amicus* (Needham), *endicotti* (Needham), *flavipes* (Charpenier), *kreyenbergi* (Ris) and *occultus* (Selys) have complete or near complete antehumeral stripes. The last three species include *gaudens* (Chao), *gideon* (Needham) and *nanningensis* Liu. The lateral thoracic patterns of *gaudens* and *gideon* are distinctive with the first and second yellow lateral stripes fused together (Zhao, 1990: 129-130, Figs 4 & 6). The thoracic pattern of the female specimen from Dinghu is identical to the males described from Nanning in the neighbouring Guangxi Province.

Distribution: China (Guangdong and Guangxi).

Heliogomphus retroflexus (Ris, 1912)

Leptogomphus retroflexus: Ris, 1912: 68-72, Figs 9-11, pl. 5 (Fig. 1), "Tonkin".

Heliogomphus retroflexus: Lieftinck *et al.*, 1984: 31, "Taiwan"; Zhao, 1990: 177-180, pl. 5-8.1 (Figs 1-14), "Fujian, Taiwan".

Material: 1 male (teneral), Dinghu Shan, 13.VI.1993; 1 male, 1 female, do., 13.VI.1994.

Distribution: China (Fujian, Guangdong and Taiwan) and Vietnam.

Leptogomphus perforatus (Ris, 1912)

Leptogomphus perforatus: Ris, 1912: 68-69, 73-75, Figs 14, pl. 3 (Fig. 4), "1 male, Ting-Wu-Shan (i.e. Dinghu Shan), leg. Mell, 800m, 22°30'N, 113°E"; Zhao, 1990: 286-288, 295-297, pl. 5-15.6 (Figs 1-9), "Guangdong"

Material: 1 male, Dinghu Shan, 13.VI.1993; 2 males, 1 female, do., 13.VI.1994; 2 male, 14.VI.1994; 2 female, do., 14.VI.1994.

Distribution: China (Guangdong).

Gomphidia krugeri fukienensis Chao, 1955

Gomphidia krugeri fukienensis: Chao, 1955: 89-92, Figs 603-604, 613-625, Fujian"; Zhao, 1990: 420, 425-428, pl. 8-3.4 (Figs 1-18); Asahina, 1978a: 6-7, Figs 16-22, "Fujian, Taiwan"; Lieftinck *et al.*, 1984: 30, "Taiwan"

Material: 1 male, Dinghu Shan, 10.VI.1994; 3 males, 1 female, do., 13.VI.1994; 2 males, do., 14.VI.1994.

Distribution: China (Fujian, Guangdong and Taiwan).

Sinictinogomphus clavatus (Fabricius, 1775)

Ictinus clavatus: Needham, 1930: 21-23, pl. 3, Figs 1, 1a, "China plain"

Ictinogomphus clavatus: Asahina, 1978b: 235, "Sichuan".

Sinictinogomphus clavatus: Chao, 1955: 85-88, Figs 593-602, "China"; Zhao, 1990: 416-420, pl. 8-2.1, (Figs 1-12) "China";

Sinictogomphus clavatus (sic) Wilson, 1995a: 336-337: "Hong Kong"; Wilson, 1995b: 126-127, 135, 137, "photo male, female, Hong Kong".

Material: 1 male, Dinghu Shan, 12.VI.1993; 1 male, do., 13.VI.1994.

Sieboldius alexanderi Chao, 1955

Sieboldius alexanderi: Zhao, 1990: 404-405, pl. 7-1.3, Figs 1-7;

Sieboldius sp.? : Saito & Ogata, 1995: 35, Figs 55-58, "1 female, Sha Lo Tung, Hong

Kong, 2.VI.1995”.

Material: 1 male, Dinghu Shan, 13.VI.1993.

Distribution: China (Fujian, Guangdong and Hong Kong?).

FAMILY: Cordulegastridae

Anotogaster flaveola Lohmann, 1993 (Fig. 26G)

Anotogaster flaveola: Lohmann, 1993: 22: 275, 278-279, Fig. 4, “Taiwan”.

?*Anotogaster flaveola*: Asahina, 1995: 21(4): 219-221, Fig. 8, “N. Vietnam”.

Anotogaster sieboldii: Needham, 1930: 102, “Fujian”.

Anotogaster sieboldii subsp.: Asahina, 1978a: 8-9, Figs 26-27, “1 male, Fujian”; Lieftinck et al., 1984: 27, “Taiwan”.

Material: 1 male, Dinghu Shan, 13.VI.1993; 1 female, do., 15.VI.1993; 3 male, do., 16.VI.1993.

Remarks: Prior to Lohmann, 1993 this taxon was treated as a subspecies of *Anotogaster sieboldii* subsp. *sieboldii* (Selys, 1854), which is much smaller and occurs in Japan, Korea and Russia. I have passed male and female material from Dinghu Shan to Mr. G.J. van Pelt of the Nationaal Natuurhistorisch Museum, Leiden, Netherlands, who is revising the Chinese Cordulegastridae.

Distribution: Vietnam, China (Fujian, Guangdong and Taiwan).

FAMILY: Corduliidae

Idionyx victor Hämäläinen, 1991

Idionyx yolanda (nec Selys, 1871): Asahina, 1965: 499, 501, Figs 18-20, “Hong Kong”.

Idionyx victor Hämäläinen, 1991: 343-347, Figs 1-4, “Hong Kong”; Wilson, 1995b: 140-141 151, 153, “photo male, female, Hong Kong”; Saito & Ogata, 1995: 38-39, Figs 73-77, “Hong Kong”; Wilson, 1996a: 364, “Hong Kong”; Muraki et al, 1996: 4, “Hong Kong”.

Material: 1 male, Dinghu Shan, 12.VI.1993; 1 female, do., 14.VI.1993; 1 female, do., 10.VI.1994; 1 male, do., 11.VI.1994; 3 females, 1 male, do., 14.VI.1994.

Macromidia rapida Martin, 1907

Macromia cantonensis: Tinkham, 1936: 457-459, “male, Canton, female, Hong Kong”.

Macromidia rapida: Martin, 1907: 79-80, Fig. 92-93, pl. 3, Fig. 18, “male, type-loc. Tonkin”; Asahina, 1965: 500, “Hong Kong”; Asahina, 1988a: 696-697, Figs 23-29, Hong Kong”; Wilson, 1993: 233-235, “Hong Kong”; Wilson, 1995b: 136-137, 147, 149, “photo male, female, Hong Kong”; Saito & Ogata, 1995: 40-41, Figs 97-100, Wilson, 1996a: 361-363, “Hong Kong”; Muraki et al, 1996: 4, Fig. 5, “Hong Kong”.

Material: 1 male, Dinghu Shan, 12.VI.1993; 1 male, do., 13.VI.1994.

Macromia urania Ris, 1916

Macromia urania: Ris, 1916: 66, 68-70, Fig. 42-43 & pl. 3, Fig. 2-3, “type-loc. Tonkin”; Lieftinck, 1929: 68, 104-106, Fig. 22, “Tonkin”; Asahina, 1940: 24, “Taiwan”; Lieftinck, 1950: 702-704, Fig. 8, 18-19, 22, 30, “Fujian, Hainan”; Matsuki & Lien, 1982: 19 (larva key), “Taiwan”; Lieftinck et al, 1984: 42-43, “Taiwan”; Wilson, 1993: 236-237, Fig. 6-10, “Hong Kong”; Wilson & Theischinger, 1996: 279-282, Figs 16-21, “larval des. Hong

Kong”; Wilson, 1995b: 132-133, 139, 141, “photo male, female, larva, Hong Kong”; Saito & Ogata, 1995: 40-41, Figs 95-96, “Hong Kong”; Muraki et al, 1996: 7, “Hong Kong”.

Material: 1 female, Dinghu Shan, 12.VI.1993.

FAMILY: Libellulidae

Tetrathemis platyptera Selys, 1878 (Fig. 26E)

Tetrathemis platyptera: Asahina, 1988b: 9-10, Figs 1-4, “Thailand”.

Material: 4 males, Dinghu Shan, 3.VI.1995.

Distribution: Burma, China (including Guangdong), India, Indonesia, Peninsular Malaysia and Thailand.

Remarks: The males of this species were observed to hold territories on favoured sticks in shallow streams margins. As shown in Fig. 26(E) egg masses were found attached to the tips of several of the sticks. Females were observed and photographed ovipositing eggs on the sticks with males hovering in close attendance. Similar behaviour was reported by Silsby (1998).

Sympetrum eroticum ardens (McLachlan, 1894)

Sympetrum ardens: Needham, 1930: 168-169, pl. 15, Fig. 13, Fujian, Sichuan, Zhejiang”.

Sympetrum eroticum ardens: Asahina, 1978a: 11-12, Figs 38-39, “Fujian”; Lieftinck et al, 1984: 55-56, “Taiwan”.

Material: 1 male, Dinghu Shan, 13.VI.1993; 1 male, do., 14.VI.1993; 1 male, do., 11.VI.1994; 1 male, do., 15.VI.1994; 1 male, do., 2.VI.1995.

Onychothemis testacea tonkinensis Martin, 1904

Onychothemis tonkinensis: Martin, 1904: 208, “type-loc. Tonkin”; Davies et al, 1985: 132, “China”.

Onychothemis tonkinensis tonkinensis: Lieftinck et al, 1984: 58, “Taiwan”.

Onychothemis testacea tonkinensis: Tsuda, 1991: 167, “Taiwan, Vietnam”; Wilson, 1995b: 179, 187, “photo male, Hong Kong”.

Material: 1 male, Dinghu Shan, Guangdong, 15.VI.1993.

Distribution: China (Guangdong, Hong Kong and Taiwan), and Vietnam. *Onychothemis testacea testacea* Laidlaw is known from Thailand, Peninsular Malaysia and Burma.

Rhyothemis triangularis Kirby, 1889

Rhyothemis triangularis: Lieftinck et al, 1984: 61-62, “Taiwan”; Asahina, 1988a: 704, “Hong Kong”; Wilson, 1995b: 184-185, 191, “photo male, female, Hong Kong”; Saito & Ogata, 1995: 44, Fig. 111, “Hong Kong”.

Material: 1 male, Dinghu Shan, 15.VI.1993; 1 male, do., 11.VI.1994.

Peninsular Malaysia, Nepal, Philippines?, Singapore, Sri Lanka, Thailand and Vietnam.

Distribution: Borneo, Burma, China (Guangdong, Hong Kong and Taiwan), India, Indonesia.

Table III. Comparison of Chinese *Zygonyx* species

	<i>Zygonyx iris insignis</i>	<i>Zygonyx asahinai</i>	<i>Zygonyx takasago</i>
Head	Upper frons and vertex bright metallic purple. Dorsal surface of frons with shallow, broad central groove. Sides of frons predominantly yellow with upper, lateral margin metallic purple.	Upper frons and vertex bright metallic blue. Dorsal surface of frons with deep, narrow central groove. Sides of frons predominantly metallic blue with basal third coloured yellow.	Upper frons and vertex bright metallic purple. Dorsal surface of frons with fairly deep broad central groove. Sides of frons predominantly dark brownish black with basal 2/5 coloured yellow.
Thorax	Antehumeral stripe broad, indistinct, dull orange yellow. Brownish yellow in mature specimens.	Antehumeral stripe narrow, distinct, bright yellow.	Antehumeral stripe very broad and dull yellow. Reduced to anterior spot in mature specimens.
Abdomen	Lateral margin of segment 9 smooth. Inferior caudal appendage markedly attenuated at centre.	Lateral margin of segment 9 keeled. Inferior caudal appendage markedly attenuated at centre.	Lateral margin of segment 9 smooth. Inferior caudal appendage broad at centre i.e. gradually attenuated towards tip.
Wings	Hyaline with tips enfumed brown. No basal marks. Pterostigma medium sized: 3.9-4.5 mm.	Hyaline. No basal marks or coloured tips. Pterostigma small: 3.4-3.5 mm.	Wing bases with distinct dark blackish brown markings and wing tips with distinct dark brown tips. Pterostigma large: 4.5-4.75 mm..
Distribution	Hainan, Hong Kong	Fujian, Hong Kong	Guangdong, Taiwan

Zygonyx takasago Asahina, 1966

Zygonyx takasago: Asahina, 1966: 118-120, Figs 43-44, "Taiwan"; Lieftinck *et al.*, 1984: 58, "Taiwan"; Wilson, 1997b: 49, "2 males, 13-14.VI.1994, Dinghu Shan".

Material: 1 male, Dinghu Shan, 15.VI.1993; 2 male, do., 13&14.VI.1994 (same material as mentioned in Wilson 1997b); 1 male, do., 15.VI.1994.

Remarks: These are the first records of *Z. takasago* for continental China. There are three *Zygonyx* species known from Chinese territory. The other two species comprise *Zygonyx iris insignis* (Kirby, 1900) and *Zygonyx asahinai* Matsuki & Saito (1995). All three Chinese *Zygonyx* are immediately recognisable as distinct species. A comparison to the three Chinese species of *Zygonyx* is given in Table III followed by a key to species.

Distribution: China (Guangdong and Taiwan).

Key to Chinese species of *Zygonyx*.

1. Lateral margin of abdominal segment 9 keeled.
Upper surfaces of frons and vertex bright metallic blue. *Zygonyx asahinai*
Lateral margin of abdominal segment 9 smooth.
Upper surfaces of frons and vertex bright metallic purple 2.
2. Sides of frons predominantly yellow with upper, lateral margin
metallic purple. Wing bases clear. *Zygonyx iris insignis*
Sides of frons predominantly dark brownish black with
basal 2/5 coloured yellow. Wing bases with
dark blackish brown marks. *Zygonyx takasago*

Additional records

Other workers have recorded a number of dragonflies not recorded in the recent surveys. These records have been compiled by Professor Hua of Zhongshan University, Guangzhou. A summary of these records was kindly passed to me by Clive Lau, Hong Kong Government Special Administrative Region (SAR), Agriculture and Fisheries Department. Nine species, listed from Dinghu Shan, by Professor Hua were not recorded in the 1992-95 surveys.

These species are listed in Table IV. No details of the material or the recorder are given so it is not possible to comment on their accuracy. Four of these species, *Cercion sexlineatum* (Selys), *Anax parthenope julius* Brauer, *Diplacodes nebulosa* (Fabricius), and *Neurothemis tullia tullia* (Drury) occur in neighbouring Hong Kong and have wide distributions. Their occurrence at Dinghu Shan would not be unexpected. These four species have been included in the faunal comparisons and checklist presented in Tables V & VI. The remaining species have been omitted from consideration until their presence at Dinghu Shan can be confirmed. *Paragomphus pardalinus* Needham is known from Guangdong and *Macromia clio* Ris from Taiwan and Japan. The last three species, *Anisogomphus maacki* (Selys), *Lyriothemis pachygastra* (Selys) and *Sympetrum croceolum croceolum* (Selys) are known from northern China, eastern China and western/northern China respectively.

Discussion

The present surveys were conducted principally during June i.e. Spring. The majority of odonate populations in Southern China begin their emergence during the onset of the rainy season which commences in late April. However, it is likely that a number of late season species would be discovered if surveys were also conducted during the mid-summer and autumn periods. Late summer species such as *Diplacodes trivialis* (Rambur) and a number of Palaearctic *Sympetrum* species would be expected to occur at Dinghu Shan.

Table IV. List of additional Dinghu Shan records obtained from Professor Hua, Zhongshan University, Guangzhou

Species	Author	Distribution
<i>Cercion sexlineatum</i>	(Selys, 1883)	China (including Guangdong, Hainan, Hong Kong, Kiangsu, Shantung and Taiwan) and the Ryukyu Islands, Japan
<i>Anax parthenope julius</i>	Brauer, 1865	China (including Fujian, Guangdong, Jiangsu, Manchuria and Taiwan), Borodino Islands, Korea, Japan and Ryukyu Islands.
<i>Anisogomphus maacki</i>	(Selys, 1872)	China (Hebei, Henan, Hubei, Liaoning, Sichuan, Yunnan, Shaanxi, Shanxi, Ningxia and Nei Mongol)
<i>Paragomphus pardalinus</i>	Needham, 1942	China (Hainan, Guangdong and Guangxi)
<i>Macromia clio</i>	Ris, 1916	China (Taiwan), Japan
<i>Diplacodes nebulosa</i>	(Fabricius, 1793)	Australia, Bangladesh, Burma, China (including Fujian, Hong Kong), India, Indonesia, Peninsular Malaysia, Nepal, New Guinea, Philippines, Sri Lanka and Thailand
<i>Lyriothemis pachygastra</i>	(Selys, 1878)	China (including Jiangsu, Sichuan and Zhejiang), Japan, Korea and Russia.
<i>Neurothemis tullia tullia</i>	(Drury, 1773)	Bangladesh, Burma, China (including Fujian, Guangdong, Hong Kong and Taiwan), India, Peninsular Malaysia, Nepal, Sri Lanka, Thailand and Taiwan
<i>Sympetrum croceolum croceolum</i>	(Selys, 1883)	China (including Sichuan), Japan, Russia.

In total, 76 odonate species were recorded at Dinghu Shan during the 1992-95 surveys. Including the four species acknowledged as previously recorded, the total fauna known from Dinghu Shan is 80 species. For comparison, 107 species are known from Hong Kong, which has a total land area of 1,092 km², and 135 species are known from Taiwan (Lieftinck et al, 1984). Dinghu Shan supports a high number of species for such a small reserve. The highest number of species for a single site in Hong Kong is 68, found within the Sha Lo Tung basin (Wilson, 1997c). However, Sha Lo Tung at approximately 200 ha, is considerably smaller than the Dinghu Shan Reserve.

Table V. Comparison of Odonate fauna from Dinghu Shan, Hong Kong and Taiwan

Family	No of species recorded from Dinghu Shan	No of species recorded from Hong Kong	No of species recorded from Taiwan	No of species found at both Dinghu Shan and Hong Kong	No of species found at both Dinghu Shan and Taiwan
Amphipterygidae	0	1	0	0	0
Calopterygidae	4	2	4	2	1
Chlorocyphidae	1	1	3	1	1
Euphaeidae	1	2	2	1	0
Lestidae	0	2	4	0	0
Synlestidae	1	0	1	0	0
Megapodagrionidae	2	2	1	1	0
Coenagrionidae	7	15	15	5	4
Platycnemididae	3	4	5	3	3
Platystictidae	2	4	0	1	0
Protoneuridae	2	2	1	2	1
Aeshnidae	9	9	18	8	5
Cordulegastridae	1	0	5	0	1
Gomphidae	14	17	22	5	6
Corduliidae	4	8	5	4	2
Libellulidae	29	38	49	26	27
Totals	80	107	135	59	51

A comparison of the Dinghu Shan odonate fauna with the odonate fauna of Hong Kong and Taiwan reveals some interesting differences. Seventy-four percent of the Dinghu Shan odonate fauna is also found in neighbouring Hong Kong and 64% is found in Taiwan. Considering the proximity of Hong Kong to Dinghu Shan and the greater distance and isolation of Taiwan from Dinghu Shan a much higher similarity with Hong Kong might have been anticipated. Hong Kong lies in the tropical zone whereas Dinghu Shan and much of Taiwan lies in the subtropical zone and there appears to be significant differences in the faunal composition. The main differences, disregarding the Amphipterygidae, Lestidae, Synlestidae, Megapodagrionidae and Cordulegastridae families, which only have one or two species occurrences, arise within the Gomphidae family.

Fourteen species of gomphid were recorded at Dinghu Shan of which 12 have not previously been recorded from Guangdong Province. Only five of these 14 species are also found in Hong Kong and six of them are reported from Taiwan. Zhao (1990) listed 173 gomphid species for China and Fujian Province was credited with the richest gomphid fauna with 27 genera and 60 species. Zhao (1990) listed just 7 genera and 11 species from Guangdong. Guangdong is a large province (197,100 square kilometres), just over a one third the size of France. The discovery of high numbers of unrecorded gomphids from just one area indicates a very high gomphid diversity within the Guangdong region. The province is likely to yield in excess of 60 species of gomphid. In 1994 *Phaenan-*

drogomphus chaoi (Zhu & Liang, 1994) was described from Guangdong. Wilson (1995a) described *Lamelligomphus hongkongensis* and *Melligomphus moluami* from Hong Kong. Wilson (1995a; 1997b) also recorded several gomphid species from Hong Kong hitherto not recorded from Guangdong. The combined gomphid total for the Hong Kong SAR and Guangdong Province is now raised to 32 taxa.

Dinghu Shan has a slightly higher proportion of dragonflies with Palaearctic origins than Hong Kong. Dinghu has 7.5 % (see Table V) and Hong Kong 6.5 % (Wilson, 1997b: 4, Table II). The most noteworthy species with Palaearctic origins are the representatives of the genera *Anotogaster* and *Sympetrum*, which have never been recorded from Hong Kong.

Checklist of species with summary of distribution details

Details of records for Guangdong, neighbouring provinces in China, Taiwan and Hong Kong are provided. A summary of distribution details for Dinghu Shan, Hong Kong, Taiwan and South China is given in Table VI.

Table VI. Checklist of species with summary of distribution details

Species	Occurrence in Hong Kong	Occurrence in Taiwan	Occurrence in S.China	New Chinese records (excl. HK & Taiwan)	Origins of taxa
1 <i>Matrona basilaris basilaris</i>	-	+	+	-	→
2 <i>Calopteryx melli</i>	-	-	+	-	→, L
3 <i>Mnais mneme</i>	+	-	+	-	→
4 <i>Neurobasis chinensis chinensis</i>	+	-	+	-	→
5 <i>Rhinocypha perforata perforata</i>	+	+	+	-	→
6 <i>Euphaea decorata</i>	+	-	+	-	→
7 <i>Sinolestes edita</i>	-	-	+	-	→, L
8 <i>Agriomorpha fusca</i>	+	-	+	-	→, L
9 <i>Philosina alba</i> sp. n.	-	-	-	+	→, E
10 <i>Agriocnemis femina oryzae</i>	+	+	+	-	↓
11 <i>Aciagrion tillyardi</i>	-	-	-	+	→
12 <i>Ischnura senegalensis</i>	+	+	+	-	W
13 <i>Cercion sexlineatum</i>	+	+	+	-	↓
14 <i>Ceriagrion auranticum</i> <i>ryukyuanum</i>	+	+	+	-	→
15 <i>Pseudagrion rubriceps rubriceps</i>	+	-	+	-	→
16 <i>Pseudagrion pruinosum fraseri</i>	-	-	+	-	→
17 <i>Coeliccia cyanomelas</i>	+	+	+	-	→

Table VI. Continued.

18	<i>Copera ciliata</i>	+	-	+	-	→
19	<i>Copera marginipes</i>	+	+	+	-	→
20	<i>Drepanosticta brownelli</i>	-	-	+	-	→, E
21	<i>Protosticta beaumonti</i>	+	-	+	-	→, L
22	<i>Prodasineura autumnalis</i>	+	-	+	-	→
23	<i>Prodasineura croconota</i>	+	+	-	+	→, L
24	<i>Anax guttatus</i>	+	+	+	-	W
25	<i>Anax immaculifrons</i>	+	-	-	+	→
26	<i>Anax parthenope julius</i>	+	+	+	-	→
27	<i>Gynacantha saltatrix</i>	+	+	+	-	→
28	<i>Gynacantha japonica</i>	+	+	-	-	↓
29	<i>Gynacantha subinterrupta</i>	+	+	+	-	→
30	<i>Cephalaeschna dinghuensis</i> sp. n.	-	-	+	+	→, E
31	<i>Polycanthagyna erythromelas</i>	+	+	-	+	→
32	<i>Tetracanthagyna waterhousei</i>	+	-	-	+	→
33	<i>Anisogomphini</i> sp.	-	-	-	+	→, E
34	<i>Anisogomphus anderi</i>	-	-	+	-	→, L
35	<i>Asiagomphus</i> sp.	-	-	-	+	→, L
36	<i>Burmagomphus vermicularis</i>	+	+	+	-	→
37	<i>Labrogomphus torvus</i>	+	-	+	-	→, L
	Species	Occurrence in Hong Kong	Occurrence in Taiwan	Occurrence in S.China	New Chinese records (excl. HK & Taiwan)	Origins of taxa
38	<i>Merogomphus paviei</i>	-	+	+	-	→
39	<i>Stylurus clathratus</i>	-	-	+	-	→, L
40	<i>Stylurus nanningensis</i>	-	-	+	-	→, L
41	<i>Heliogomphus retroflexus</i>	-	+	+	-	→
42	<i>Leptogomphus perforatus</i>	-	-	+	-	→, E
43	<i>Ictinogomphus pertinax</i>	+	+	+	-	→
44	<i>Sinictinogomphus clavatus</i>	+	+	+	-	↓
45	<i>Gomphidia krugeri fukienensis</i>	-	+	+	-	→
46	<i>Sieboldius alexanderi</i>	?	-	+	-	→, L
47	<i>Anotogaster flaveola</i>	-	+	+	-	↓
48	<i>Epophthalmia elegans</i>	+	+	+	-	→
49	<i>Macromia urania</i>	+	+	+	-	→
50	<i>Idionyx victor</i>	+	-	-	+	→, L
51	<i>Macromidia rapida</i>	+	-	-	-	→
52	<i>Tetrathemis platyptera</i>	-	-	+	-	→
53	<i>Brachydiplax chalybea flavovittata</i>	+	+	+	-	→

Table VI. Continued.

54	<i>Nannophya pygmaea</i>	+	+	+	-	→
55	<i>Lyriothemis elegantissima</i>	+	+	+	-	→
56	<i>Orthetrum chrysis</i>	+	-	+	-	→
57	<i>Orthetrum glaucum</i>	+	+	+	-	W
58	<i>Orthetrum luzonicum</i>	+	+	+	-	↑
59	<i>Orthetrum pruinatum neglectum</i>	+	+	+	-	→
60	<i>Orthetrum sabina sabina</i>	+	+	+	-	W
61	<i>Orthetrum triangulare</i>					
	<i>triangulare</i>	+	+	+	-	→
62	<i>Acisoma panorpoides</i>					
	<i>panorpoides</i>	+	+	+	-	→
63	<i>Brachythemis contaminata</i>	+	+	+	-	→
64	<i>Crocothemis servilia servilia</i>	+	+	+	-	W
65	<i>Neurothemis fulvia</i>	+	+	+	-	→
66	<i>Neurothemis tullia tullia</i>	+	+	+	-	→
67	<i>Diplacodes nebulosa</i>	+	+	+	-	→
68	<i>Sympetrum eroticum ardens</i>	+	+	+	-*	↓
69	<i>Pseudothemis zonata</i>	+	+	+	-	→
70	<i>Trithemis aurora</i>	+	+	+	-	→
71	<i>Trithemis festiva</i>	+	+	+	-	W
	Species	Occurrence in Hong Kong	Occurrence in Taiwan	Occurrence in S.China	New Chinese records (excl. HK & Taiwan)	Origins of taxa
72	<i>Onychothemis testacea</i>					
	<i>tonkinensis</i>	+	+	-	+	→
73	<i>Palpopleura sexmaculata</i>					
	<i>sexmaculata</i>	+	+	+	-	→
74	<i>Rhyothemis triangularis</i>	+	+	-	+	→
75	<i>Hydrobasileus croceus</i>	+	+	+	-	→
76	<i>Pantala flavescens</i>	+	+	+	-	W
77	<i>Tramea virginia</i>	+	+	+	-	→
78	<i>Tholymis tillarga</i>	+	+	+	-	W
79	<i>Zyxomma petiolatum</i>	+	+	+	-	W
80	<i>Zygonyx takasago</i>	-	+	-	+	→, L

* New record for Guangdong Province.
W = Widely distributed species, belonging to more than one zoogeographical region.
→ = Tropical species of northern Oriental origin i.e. tropical continental Asia with origins in India (Assam), Burma, Peninsular Malaysia, Vietnam, Indo-China or southern China.
L = Regionally local species with ranges restricted to Guangdong and/or Southern China.
↓ = Species with Palaearctic origins from the north or north-east.
E = Endemic to Guangdong.
↑ = Tropical species with southern origins from Celebes, Philippines etc.
- = non occurrence
+ = occurrence

Acknowledgements

I am grateful to David C. Cook and Graham Reels for assistance with specimens and to Günter Theischinger for the German translation of Ris (1917). I would also like to acknowledge and thank the Kadoorie Farm & Botanic Garden for sponsoring the 1998 survey work.

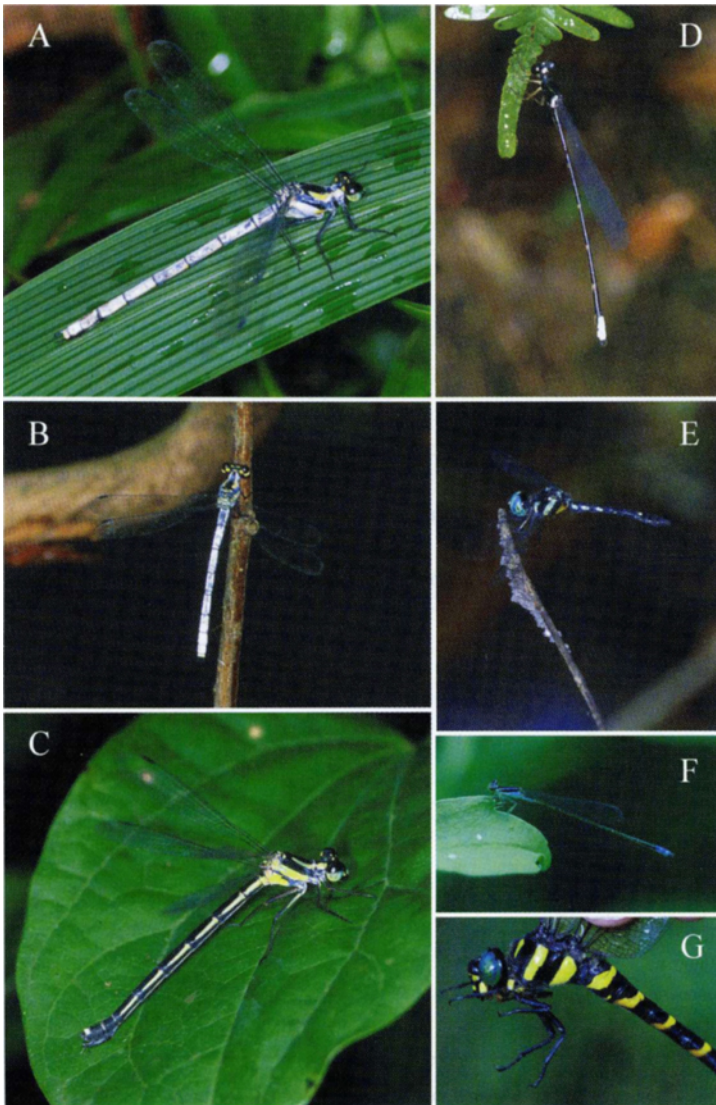


Figure 26. [A-C] *Philosina alba* sp. n. Guangdong, China: (A-B) male; (C) female. (D) *Drepanosticta brownelli* Tinkham, Guangdong, China, male. (E) *Tetrathemis platyptera* Selys, Guangdong, China, male perched above stream on 'oviposition stick', with several egg mass deposits attached. (F) *Aciagrion tillyardi* (Laidlaw), Guangdong, China, male. (G) *Anotogaster flaveola* Lohmann, Guangdong, China, female.

References

- Asahina, S., 1940. Some unrecorded Odonata from Formosa. *Kontyû* 14: 23-25.
- Asahina, S., 1956. Dragonflies from West Tien-Mu-Shan, Central China. *Entomologiske Meddelser* 27: 204-228.
- Asahina, S., 1965. The Odonata of Hong Kong. *Kontyû* 33: 493-506.
- Asahina, S., 1966. Taiwanese Odonata taken during 1965 field works. *Kontyû* 34: 105-121.
- Asahina, S., 1968. Taiwanese Odonata taken by Mr. Y.I. Chu. *Kontyû* 36: 89-98.
- Asahina, S., 1978a. Notes on Chinese Odonata, IX. Kellogg collection in the U.S. National Museum of Natural History. *Tombo* 11: 2-14.
- Asahina, S., 1978b. Notes on Chinese Odonata VII. *Kontyû* 46: 234-252.
- Asahina, S., 1979. Notes on Chinese Odonata VIII. Three small collections in the U.S. National museum of Natural History. *Kontyû* 47: 328-334.
- Asahina, S., 1981a. A revision of the Himalayan dragonflies of the genus *Cephalaeschna* and its allies (Odonata, Aeschnidae). *Bulletin of the National Science Museum, Tokyo* 7: 27-49.
- Asahina, S., 1981b. A revision of the Chinese dragonflies of the genus *Cephalaeschna* and its allies. *Tombo* 24: 2-12.
- Asahina, S., 1982. Studies on the Chinese dragonflies of the genus *Cephalaeschna* and its allies in the collection of the Leiden Museum. *Tombo* 25: 7-15.
- Asahina, S., 1983. Further contributions to the knowledge of Nepalese and their allies (Odonata, Aeschnidae). *Bulletin of the National Science Museum, Tokyo, Ser. A* 9: 51-67.
- Asahina, S., 1986. A list of Odonata recorded from Thailand. *Tombo* 29: 71-106.
- Asahina, S., 1987. A revised list of the Odonata of Hong Kong. Part 1. *Zygoptera*. *Tombo* 30: 7-24.
- Asahina, S., 1988a. A revised list of the Odonata of Hong Kong. II. *Anisoptera*. *Kontyû* 56: 689-705.
- Asahina, S., 1988b. A list of the Odonata from Thailand. Part XIX, *Libellulinae*-1. *Tombo* 31: 9-26.
- Asahina, S., 1995. Records of the Northern Vietnamese Odonata taken by the Expedition Members from the National Science Museum, Tokyo. I. *Cordulegastridae*. *Bulletin of the National Science Museum, Tokyo, Ser. A* 21: 219-229.
- Bridges, F., 1994. *Catalogue of the family-group, genus-group and species-group names of the Odonata of the World* (3rd edn.) 13 vols., 3 apps., 824 Figs, Pub. C.A. Bridges, Urbana, Illinois.
- Chao, H.F., 1947. On the systematic position, nymphal characters and new species of the genera *Megalestes* and *Sinolestes* (Odonata). *Biological Bulletin Fukien Christian University, Foochow* 6: 15-25.
- Chao, H.F., 1953. Classification of Chinese dragonflies of the family Gomphidae, I. *Acta entomologica sinica* 3: 375-434.
- Chao, H.F., 1954. Classification of Chinese dragonflies of the family Gomphidae. II-IV. *Acta entomologica sinica* 4: 23-82, 213-275, 399-426.
- Chao, H.F., 1955. Classification of Chinese dragonflies of the family Gomphidae. V. *Acta entomologica sinica* 5: 72-103.
- Davies, D.A.L. & P. Tobin, 1985. The Dragonflies of the World: A systematic list of the extant species of Odonata. Vol. 2. *Anisoptera*. SIO, Rapid Communication (Supplements) No.5. Utrecht. vi + 151 pp.
- Fraser, F.C., 1936. *Fauna of British India, including Ceylon and Burma. Odonata* Vol III, London, Taylor & Francis. xi + 461 pp.
- Hämäläinen, M., 1991. *Idionyx victor* spec. nov. (Anisoptera: Corduliidae) and some other Odonata from Hongkong. *Odonatologica* 20: 343-347.
- Kong, G.H., Liang C., Wu H. M. and Huang Z. L., 1993. Dinghushan Biosphere Reserve. Ecological Research History and Perspective. Science Press, Beijing.

- Laidlaw, F.F., 1924. Notes on oriental dragonflies of the genus *Aciagrion*. Proceedings of the U.S. National Museum 66(10)(2547): 1-9.
- Lieftinck, M.A. 1929. Contributions to the dragonfly fauna of the Sondaic area. Tijdschrift voor Entomologie 72: 109-147.
- Lieftinck, M.A., 1935. A synopsis of the Odonata (dragonflies) of Sumatra. Miscelanea zoologica sumatrana 92/93: 1-23.
- Lieftinck, M. A., 1950. Further studies on southeast Asiatic species of *Macromia* Rambur, with notes on their ecology, habits and life history. And with descriptions of larvae and two new species. Treubia 20: 657-716.
- Lieftinck, M.A., Lien, J.C. & Maa, T.C. 1984. *Catalogue of Taiwanese Dragonflies (Insecta: Odonata)* Asian Ecological Society, Taichung, Taiwan. 81 pp.
- Lohmann, H., 1993. Revision der Cordulegastridae. 2. Beschreibung neuer Arten in den Gattungen *Cordulegaster*, *Anotogaster*, *Neallogaster* und *Sonjagaster* (Anisoptera). Odonatologica 22: 273-294.
- Kirby, W.F., 1900. On a small collection of Odonata (Dragonflies) from Hainan, collected by the late John Whitehead. Annals and Magazine of Natural History, London (7)5: 539-542.
- Martin, R., 1904. List of Neuroptères de l'Indo-Chine. In *Mission Pavie Indo-Chine* 3: 204-221.
- Martin, R., 1907. Cordulines. *Collections Zoologiques du Baron Edm. De Selys Longchamps*. Catalogue systématique et descriptif 17: 1-94.
- Martin, R., 1908. Aeshnines. *Collections Zoologiques du Baron Edm. De Selys Longchamps*. Catalogue systématique et descriptif. Fasc. 18: 1-84.
- Matsuki, K., 1978. Taxonomic studies of the larval stage of Gomphidae in Taiwan. Annual Report Taiwan Provincial Museum 21: 133-180.
- Matsuki, K., 1988. Description of the larvae of *Tetracanthagyna waterhousei* (McLachlan) from Hong Kong and Thailand (Aeshnidae: Odonata). Tombo 31: 37-40. (Jap with Engl. Title).
- Matsuki, K., 1991. Description of the larval stage of *Prodasineura croconota* (Ris) from Taiwan (Protoneuridae, Odonata). Tombo 34: 27-28. (Jap with Engl. Title).
- Matsuki, K. & J.C. Lien, 1982. Descriptions of the larvae of two *Macromia* species, Taiwan. Tombo 25: 19-22.
- Matsuki, K. & J.C. Lien, 1985. Description of the larvae of *Polycanthagyna erythromelas paiwan* Asahina from Taiwan (Aeshnidae: Odonata). Gekkan Mushi 173: 9-11.
- Matsuki, K. & Y. Saito, 1995. A new *Zygonyx* from Hong Kong (Odonata: Libellulidae). Tombo 38: 19-22.
- Matsuki, K., T. Yamamoto & H. Ichii, 1990. On a small collection of Odonata of Hong Kong. Gekkan-Mushi 235: 12-18 (Jap., with Engl. Title).
- Muraki, A., N. Masaki, A. Sugitani & K. Kitagawa, 1996. Records of the Odonata of Hong Kong. Part III. *Aeschna* 32: 1-8.
- Needham, J.G., 1930. A manual of the dragonflies of China. *Zoologia Sinica* 11: i-xi, 1-344, 2 Figs, 20 pls.
- Needham, J.G., 1931. Dragonflies of Hainan. Lingnan Science Journal, Canton 10: 223-232.
- Ris, F., 1912. Neue Libellen von Formosa, Südchina, Tonkin, und den Philippinen. Supplementa entomologica 1: 44-85, 3 pls.
- Ris, F., 1916. H. Sauter's Formosa Ausbeute, Odonata, mit Notizen über andere Ostasiatischen Odonaten. Supplementa entomologica 5: 1-81, 3 pls.
- Ris, F., 1917. Eine neue Agrioniden-Gattung der "Légion Podagrion" (Odonata) aus China. Tijdschrift voor Entomologie 60: 185-191.
- Saito, Y and S. Ogata, 1995. Records of Hong Kong dragonflies, collected from June 1994 to October 1995. Bohso no Konchu 15: 25-47. (Jap.)
- Selys, Longchamps, Edm. De, 1854. Monographie des Caloptérygines. Mémoires de la Société des Sciences de Liège 9, xi+291.

- Silsby, J., 1998. *Tetrathemis polleni*, its reproductive behaviour and preferred habitat. *International Journal of Odonatology* 1: 96-97.
- Tinkham, E.R., 1936. A new species of *Macromia* from Canton. *Lingnan Science Journal*, Canton 15: 457-459.
- Tinkham, E.R., 1938. A new species of *Ceylonosticta* Fraser from South China (Odonata: Zygoptera, Coenagrionidae). *Lingnan Science Journal*, Canton 17: 17-19.
- Tsuda, Shigeru, 1991. A World Distributional List of World Odonata. Osaka. pp. 362.
- Wilson, K.D.P., 1993. Notes on the *Macromia* (Anisoptera: Corduliidae) of Hong Kong with description of *Macromia katae* spec. nov. *Odonatologica* 22: 233-241.
- Wilson, K.D.P., 1995a. The Gomphid dragonflies of Hong Kong, with descriptions of two new species (Anisoptera: Gomphidae) *Odonatologica* 24: 319-340.
- Wilson, K.D.P., 1995b. *Hong Kong Dragonflies*. Urban Council of Hong Kong. pp. 211, col. photos. 265.
- Wilson, K.D.P., 1996a. The Idionychinae (Anisoptera: Corduliidae) from Hong Kong with a description of *Macromidia ellenae* spec. nov. *Odonatologica* 25: 355-366.
- Wilson, K.D.P., 1996b. Dragonflies, Dinghu Shan 4. *Porcupine*. Newsletter of the Department of Ecology and Biodiversity, Hong Kong University. No. 14.
- Wilson, K.D.P., 1997a. The Platystictidae of Hong Kong and Guangdong with descriptions of a new genus and two new species (Zygoptera). *Odonatologica* 26: 53-63.
- Wilson, K.D.P., 1997b. An annotated checklist of the Hong Kong dragonflies with recommendations for their conservation. *Memoirs Hong Kong Natural History Society* 21: 1-68, pl. 1.
- Wilson, K.D.P., 1997c. The odonate faunas from two Hong Kong streams with details of site characteristics and developmental threats. *Odonatologica* 26: 193-204.
- Wilson, K.D.P. & G. Theischinger, 1996. Further notes on the *Macromia* Rambur from Hong Kong, with descriptions of the larvae (Anisoptera: Corduliidae). *Odonatologica* 25: 275-282.
- Zhao, Xiufu (= Chao, Hsiu-fu), 1990. *The Gomphid Dragonflies of China (Odonata: Gomphidae)*. The Science and Technology Publishing House, Fuzhou, Fujian, China. pp. 486 (Chinese with Eng. sum. and keys).
- Zhu, H-Q & Liang, G-Q., 1994. *Phaenandrogomphus chaoi* spec. nov. a new dragonfly from Guangdong, Peoples' Republic of China. (Anisoptera: Gomphidae). *Advances in Odonatology* 6: 113-116.